

Timber flooring installation

Correct practice for solid strip floors

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Learning Objectives

- Participants completing this activity will be able to:
 - Understand the link between moisture control and the installation of timber flooring.
 - Install strip flooring in a range of applications.
 - Specify and control timber strip floor installation.
- For architects - AACA Competencies:
 - Design
 - Documentation



This presentation

- Control of moisture
 - in storage & preparation
- Installation
 - Conventional on joists or battens
 - Overlay
- Finishing



Vertical board cladding

Control of moisture

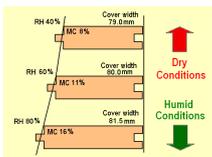
Detailing around the floor must exclude moisture.

Boards must be protected from moisture and damage.

Timber and moisture



- Boards need to be laid at the correct moisture content.
- A moisture content to AS 2796 is generally suitable (9-14% MC).
- Strip flooring will always move slightly between the boards.



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Acclimatisation

Timber	Service Environment	Response and Required Action
Flooring supplied at a moisture content between 10% and 12 %	Moist Conditions Average MC ~ 12.5–16% • Cool & damp or hot & very humid	Timber expands • Provide extra expansion joints • Acclimatise
	Normal Conditions Average MC ~ 10–12.5%	Timber remains relatively stable.
	Dry Conditions Average MC ~ 8–10% • Air conditioned, centrally heated, or with large northern windows	Timber contracts • Acclimatise • Consider alternatives to polyurethane finishes

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What affects moisture content 

Drying - Storage

- Storage in the sun

Drying - Arrangement

- Large windows.
- Heaters of all types - fires, heat pumps.
- Air conditioners.
- Warm air moving to upstairs rooms.

Wetting - Storage

- Exposed storage
 - Fresh concrete
 - Rain, ripped pack covers

Wetting - Arrangement

- Platform floors.
- Wet sub-floors.
- Damp concrete.
- Wet trades.
- Moisture movement in the concrete.

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Protecting the timber from moisture 

- Ideally, the flooring should be stored inside where it is to be laid, or in a similar environment.
- Only install the floor in a fully weatherproofed building.
- Slabs are dry or sealed.



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Control sources of moisture 

- Ensure adequate sub-floor ventilation.
- Provide subsoil drains or swales on the slopes above the house.
- Make sure surrounding gardens & paths are below & fall away from the sub-floor.
- Make broken plumbing or downpipes good immediately.
- Be wary of poor or broken moisture barriers under slabs or missing barriers on slabs.

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Storage & preparation problems 



- Damp sub-floors.
- Uneven joists.
- Wet or fresh concrete.
- Strip flooring as a platform floor.

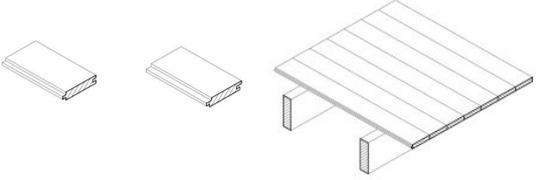
The effects of poor storage.
Delivered at the same time, the left hand board was left in the sun.

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Installation – strip flooring 

Strip flooring as a structural floor

Strip flooring 



Standard and secret nail profiles

Strip flooring on joists

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End matched boards




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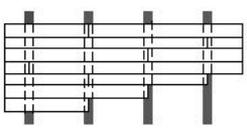
Framing is solid, level, true & dry



- Place a 3 m straight edge along & across the top of joists.
- Variation should not exceed 3 mm.
- Plane proud joists & pack low ones.

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Lay boards in straight, parallel lines

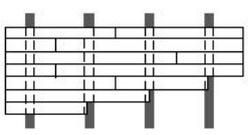



Butt jointed boards

- Board should be at least two joist spacings long.
- Ensure all end joints are tightly closed & distributed evenly throughout the floor.

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Space butt joints evenly

End matched boards

- Maintain min. 450 mm between butt joints in adjacent rows. &
- Ensure joints in adjacent rows of end matched boards do not fall in the same joist spacing.

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The right glue and fasteners are essential



- Only use **elastomeric** glues
- Nail sizes for flooring are specified in AS 1684 Residential timber-framed construction
- Two nails per joist for boards over 85 mm cover.
- Nailing rates for strip flooring to ply sheet are also provided in AS 1684.

Nailing	Softwood joists	Hardwood joists
Hand	65 × 2.8	50 × 2.8
Machine	65 × 2.5	50 × 2.5

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Nailing & pre-drilling



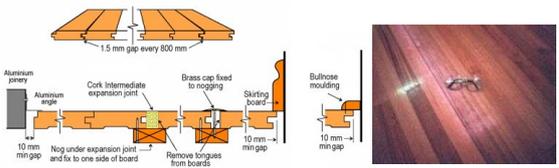
- Keep the nail lines straight & punch them a min. 3 mm below the surface of the boards.
- Depending on the species, end nailing at the butt joint can cause board splitting.
 - If this occurs, pre-drill the nail holes to 80% of the nail diameter.



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Provide expansion gaps to AS 1684 

- Flooring will expand & contract with moisture changes.
- Install expansion joints:
 - 10 mm gap at every wall plate. &
 - intermediate gaps in floors over 6 m wide.
- Use narrower boards for large areas of floor.



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Cramp boards tight 

- For top nailed boards, cramp no more than 800 mm width of flooring at a time, closing any gaps.
- There should be full contact between the boards & the frame or substrate.
- For secret nailing, cramp each board tight or use specialist fastening guns.

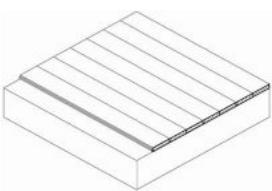
ANY GLUE USED MUST BE ELASTOMERIC

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Installation – overlay 

Strip flooring as an overlay on a structural substrate.

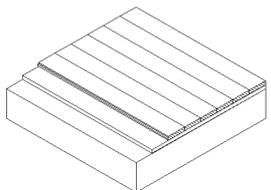
Direct stick to concrete 



- Work with about 4-6 rows of boards at a time.
- Maintain min. 450 mm stagger between butt joints in adjacent rows.
- Use concrete nails as temporarily fixing at least every 4 boards.
 - Drive them half home at 1200 mm along the board.
- Remove nails after the glue cures.

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Overlay on plywood 



- Glue and secret nail or staple each board.
- Maintain min. 450 mm stagger between butt joints

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Substrates must be dry 

- Supporting slabs should have a moisture content of no more than 5.5%.
- All other substrates must be dry.
- Sealing the slab with a waterproofing compound or membrane may be necessary. This can be a:
 - Sealer coating. or
 - Plastic membrane.



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Substrates should be flat 

- Slab surfaces should be flat, level & sound.
- The variation from a 3 m. straight edge should not exceed 3 mm, or 2 mm from a 1.5 m edge.
- Existing flooring or sheet floors should be roughly sanded.
- Substrates can be repaired or leveled with:
 - Patching & Leveling compounds.
 - Plywood underlay or battens.

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Installation on sheet flooring 



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Glues must allow the flooring to move 

- Only specialist elastomeric flooring glues should be used.
- Apply strictly to manufacturer's recommendations, including details for:
 - Substrate preparation
 - Spreading
 - Pot life



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Lay boards in straight & parallel lines 

- Allow 10 mm expansion gaps at all edges.
- Set the first board out straight. Profile if necessary.
- After applying glue, fix the first board.
- Nails ensure the boards remain tight and in firm contact with the adhesive.



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Sheet flooring 



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Installation on a slab 



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Finishing

The quality of the finished timber floor is directly related to the quality of the surface preparation.

Protect the boards

- Prior to sanding and finishing, and during construction.
- Plasterboard setting compounds & other chemicals can stain timber & lead to later discolouration.
- Silicone sealants can affect the bond of the finish.
- Scaffolding, ladders, & dropped tools can dent the timber significantly.

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Prepare the floor thoroughly



- Ensure all nails are punched adequately.
- Fill the punched nail holes with a filler compatible with the proposed finish.
- Glue must be allowed to cure – up to 72 hours.

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Employ specialist finishing contractors 



- The floor needs to be sanded to a flat & level surface.
- Deep scratch marks should not be present or accepted.
- Equally, do not expect a “furniture quality” finish on site.

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A furniture grade finish isn't possible 




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Select the coating to suit the project. 

There are four major classes of finish:

- Moisture curing polyurethanes
- Water-based polyurethanes
- Modified oil coatings
- Oils



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Moisture curing polyurethanes 

- Available as popular single & two pack products.
- They produce a clear, very hard wearing surface in a matt, satin or high gloss finish.
- They darken with age.
- They can also glue the tongue of one board into the groove of the next if applied inappropriately.
 - This causes problems later.



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Water-based polyurethanes 

- These finishes also produce a clear, hard wearing surface.
- While more expensive and not as hard, they are becoming more popular as they produce less fumes during application and curing.
- They are trafficable earlier and do not yellow as much.
- They can also stick boards together.

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Modified oil coatings 

- These are clear varnishes, generally made from a mixture of resin & oil.
- Easy to apply & penetrating, these give a slightly softer look than the polyurethanes but are less hard-wearing.
- They can be recoated in small patches.
- They darken with age.
- A surface polish is recommended in commercial applications to reduce maintenance.

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Penetrating oils



- These are penetrating finishes that are generally less hard wearing than the modified oils or polyurethanes.
- They give a soft, natural appearance.
- They require regular maintenance and can lead to mould growth in cold & damp locations.
 - Oil is an excellent food for fungi.

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Follow the instructions explicitly



- Many problems with timber floors are due to inappropriate application of the finish.
- Do not thin the finish unnecessarily. &
- Only apply it to a stable & well laid floor.



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Summary



- Timber provides an excellent floor
- Like all building elements, they require care and skill to install properly.
 - The timber has to be installed at the correct moisture content. Site moisture has to be controlled.
- Support structures or substrates should be flat, level and not a potential moisture source.
- Clear installation instructions are available for most flooring product types.
- The coating selection is important, especially in rooms with varying moisture content.
- Most flooring problems results from poor moisture control or varying moisture contents.

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Problems and probable causes

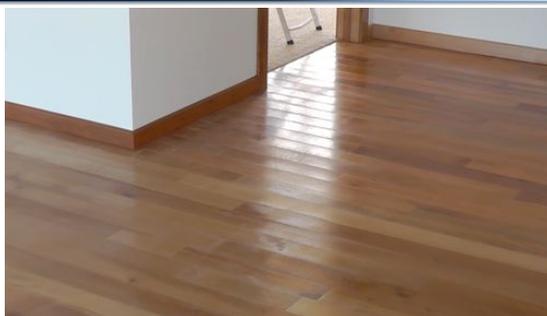
Area of particular care



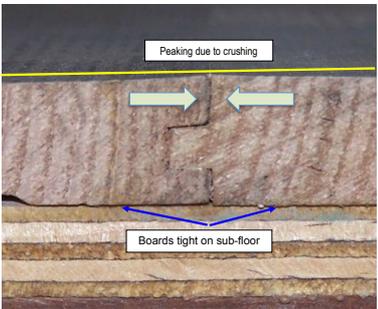
- Poor moisture protection of slabs.
- Poor sub-floor ventilation.
- Inadequate expansion gaps.
- The history & position of heaters & AC.
- The effects of large north facing windows.
- Incorrect nailing size and number.
- Inadequate gluing.
- Improper finishing - leading to slabbing.

Design Potential

Peaking: moisture + expansion



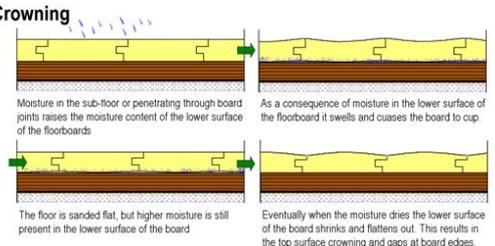
Peaking: expansion + crushing

Peaking due to crushing

Boards tight on sub-floor

An unwise response

Crowning

Moisture in the sub-floor or penetrating through board joints raises the moisture content of the lower surface of the floorboards

As a consequence of moisture in the lower surface of the floorboard it swells and causes the board to cup.

The floor is sanded flat, but higher moisture is still present in the lower surface of the board

Eventually when the moisture dries the lower surface of the board shrinks and flattens out. This results in the top surface crowning and gaps at board edges.

Peaking and inadequate gluing




Shrinkage in a hot room




Slabbing: adhesion and shrinkage




Causes of problems



- In our experience, problems occur in only a small percentage of floors.
- They rarely have a single cause.
 - A proportion are due to unrealistic expectation.
 - Others are due to changing ambient conditions, such as a new heater or garden, or broken pipes;
 - The remainder result from poor moisture control and inappropriate building practice.

Design Potential

More Information



Wood Solutions
design and build
www.woodsolutions.com.au



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Questions?



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